Humans as geological and geomorphological agents in the Anthropocene

Simon J Price[1], Jonathan R Ford[1], Anthony H Cooper[1], Colin Waters[1], Don Aldiss[1], Teresa Brown[1] and Alan Smith[1]

[1]British Geological Survey, Nottingham, United Kingdom

Abstract

Humans have become dominant forces in the transformation of the Earth's landscape and its corresponding geological and geomorphological response. The deliberate, current and historical anthropogenic modification of the landscape and its subsurface creates sediments and landforms in the form of artificial ground. Artificial ground is recognisable as distinct geomorphological landforms or where its sediments are buried in the ground.

The magnitude and rate of intentional human landscape transformation and creation of artificial ground has fluctuated through time. It is estimated that the deliberate global movement of rock and soil through mineral exploitation and processing exceeds that of sediment transport to the oceans by almost a factor of three (Douglas & Lawson, 2001). In Great Britain it has been estimated that over 66 500 M (Million) tonnes of material has been moved in about 150 years as a result of mineral exploitation alone.

Localised working for minerals and domestication of land for food production, rapidly expanded as human population grew. Subsequent industrialisation, burning of fossil fuels and rapid urbanisation in developed countries resulted in large scale land transformation as populations grew, lived longer and generated more wealth. The rate and magnitude of the creation of artificial ground has varied through time, but it is now significant on a global scale. The role of humans in shaping the landscape and creating distinctive and novel landforms and sediments is unique in Earth's history. This style of '*anthroturbation*' may be one of many changes to the Earth's biological, chemical and physical systems that characterise the proposed new epoch of the Anthropocene.

Douglas, I. & Lawson, N. 2001 The Human Dimensions of Geomorphological Work in Britain. *Journal of Industrial Ecology* **4**, 9-33